

**THAT WHICH IS CLAIMED IS:**

1. A method for the targeted insertion of a nucleotide of interest into a specific chromosomal site within a plant cell, said method comprising the steps of:
- 5 (a) providing a plant cell having a heterologous target site on a chromosome thereof, wherein said target site is flanked by at least one recombination site; and then
- (b) transforming said plant cell with an *Agrobacterium* transformation vector carrying a nucleotide sequence of interest, wherein said nucleotide sequence of interest is flanked by at least one recombination site that correspond to the
- 10 recombination sites of said target site, so that said nucleotide of interest is inserted into said chromosome at said target site.
2. A method according to claim 1, wherein said transforming step is carried out in the presence of a site-specific recombinase effective to carry out recombination
- 15 at said recombination site and insert said nucleotide of interest into said chromosome at said target site.
3. A method according to claim 1, wherein said target site is flanked by a single recombination site positioned 5' thereto.
- 20 4. A method according to claim 1, wherein said target site is flanked by a pair of recombination sites positioned 5' and 3' thereto.
5. A method according to claim 1, wherein said nucleotide sequence of interest is flanked by a single recombination site positioned 5' thereto.
- 25 6. A method according to claim 1, wherein said nucleotide sequence of interest is flanked by a pair of recombination sites positioned 5' and 3' thereto.
- 30 7. A method according to claim 1, wherein said heterologous target site is inserted into said chromosome by *Agrobacterium*-mediated transformation.
8. A method according to claim 1, wherein said recombinase is an integrase.

9. A method according to claim 1, wherein said recombinase is selected from the group consisting of FLP recombinase, Cre recombinase, and recombinase R.

10. A method according to claim 1, wherein said recombinase is FLP  
5 recombinase, and said recombination sites are FLP recombination target (FRT) sites.

11. A method according to claim 1, wherein said plant cell is a dicot plant cell.

10 12. A method according to claim 1, wherein said plant cell has a genome size greater than 500 megabases.

13. A method according to claim 1, wherein said transforming step is carried out *in vitro* on a population of cells, some of which are transformed and some of  
15 which are not transformed, and said transforming step is followed by the steps of:  
selecting at least one transformed cell from said population of cells; and then  
regenerating a plant from said at least one transformed cell.

14. A method according to claim 13,  
20 wherein said selecting step is carried out by contacting said population of plant cells to an antibiotic;  
and wherein said transforming step is carried out with a vector that carries a selectable marker, which selectable marker imparts resistance to said antibiotic to said transformed cells.

25 15. A plant cell produced by the method of claim 1.

16. A plant produced by a method according to claim 1.

30 17. Seed produced from a plant according to claim 16.

18. Pollen produced from a plant according to claim 16.